

Chapter 16

GRAY WATER SYSTEMS

Part I

1601.0 Gray Water Systems – General.

- (A) The provisions of this chapter shall apply to the construction, alteration, and repair of gray water systems for underground landscape irrigation. Installations shall be allowed only in single-family dwellings. The system shall have no connection to any potable water system and shall not result in any surfacing of the gray water. Except as otherwise provided for in this chapter, the provisions of this code shall be applicable to gray water installation.
- (B) The type of system shall be determined on the basis of location, soil type, and groundwater level, and shall be designed to accept all gray water connected to the system from the residential building. The system, except as otherwise approved, shall consist of a holding tank or tanks that discharge into subsurface irrigation/disposal fields.
- (C) No gray water system or part thereof shall be located on any lot other than the lot that is the site of the building or structure that discharges the gray water, nor shall any gray water system or part thereof be located at any point having less than the minimum distances indicated in Table 16-1.
- (D) No permit for any gray water system shall be issued until a plot plan with appropriate data satisfactory to the Authority Having Jurisdiction has been submitted and approved. When there is insufficient lot area or inappropriate soil conditions for adequate absorption of the gray water, as determined by the Authority Having Jurisdiction, no gray water system shall be permitted.
- (E) No permit shall be issued for a gray water system on any property in a geologically sensitive area as determined by the Authority Having Jurisdiction.
- (F) Private sewage disposal systems existing or to be constructed on the premises shall comply with Appendix K of this code. In addition, appropriate clearances from the gray water systems shall be maintained as provided in Table 16-1. The capacity of the private sewage disposal system, including required future areas, shall not be decreased or otherwise affected by the existence or proposed installation of a gray water system servicing the premises.

1602.0 Definition.

Gray water is untreated household waste water that

has not come into contact with toilet waste. Gray water includes used water from bathtubs, showers, and bathroom wash basins, and water from clothes-washers and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers.

1603.0 Permit.

It shall be unlawful for any person to construct, install, or alter, or cause to be constructed, installed, or altered any gray water system in a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction.

1604.0 Drawings and Specifications.

The Authority Having Jurisdiction may require any or all of the following information to be included with or in the plot plan before a permit is issued for a gray water system, or at any time during the construction thereof:

- (A) Plot plan drawn to scale and completely dimensioned, showing lot lines and structures, direction and approximate slope of surface, location of all present or proposed retaining walls, drainage channels, water supply lines, wells, paved areas and structures on the plot, number of bedrooms and plumbing fixtures in each structure, location of private sewage disposal system and 100 percent expansion area or building sewer connecting to the public sewer, and location of the proposed gray water system.
- (B) Details of construction necessary to ensure compliance with the requirements of this chapter, together with a full description of the complete installation, including installation methods, construction, and materials as required by the Authority Having Jurisdiction.
- (C) A log of soil formations and groundwater level as determined by test holes dug in proximity to any proposed irrigation area, together with a statement of water absorption characteristics of the soil at the proposed site as determined by approved percolation tests.

Exception: The Authority Having Jurisdiction may allow the use of Table 16-2 in lieu of percolation tests.

1605.0 Inspection and Testing.

(A) Inspection.

- (1) All applicable provisions of this chapter

and of Section 103.5 of this code shall be complied with.

- (2) System components shall be properly identified as to manufacturer.
- (3) Holding tanks shall be installed on dry, level, well-compacted soil if underground or on a level three (3) inch (76 mm) concrete slab if aboveground.
- (4) Holding tanks shall be anchored against overturning.
- (5) If a design is predicated on soil tests, the irrigation/disposal field shall be installed at the same location and depth as the tested area.
- (6) Installation shall conform with the equipment and installation methods identified in the approved plans.

(B) Testing.

- (1) Holding tanks shall be filled with water to the overflow line prior to and during inspection. All seams and joints shall be left exposed, and the tank shall remain watertight.
- (2) A flow test shall be performed through the system to the point of gray water irrigation/disposal. All lines and components shall be watertight.

1606.0 Procedure for Estimating Gray Water Discharge.

(A) The number of occupants of each dwelling unit shall be calculated as follows:

First bedroom	2
Each additional bedroom	1

(B) The estimated gray water flows for each occupant shall be calculated as follows:

Showers, bathtubs, and washbasins	25 GPD (95LPD)
Laundry	15 GPD (57 LPD)

(C) The total number of occupants shall be multiplied by the applicable estimated gray water discharge as provided above, and the type of fixtures connected to the gray water system.

Example 1:

Single-family dwelling; three bedrooms with showers, bathtubs, washbasins; and laundry facilities all connected to the gray water system:

Total number of occupants = 2 + 1 + 1 = 4

Estimated gray water flow = 4 x (25 + 15) = 160 GPD
(metric) = 4 x (95 + 57) = 608 LPD

Example 2:

Single-family dwelling; four bedrooms with only the clothes washer connected to the gray water system:

Total number of occupants = 2 + 1 + 1 + 1 = 5

Estimated gray water flow = 5 x 15 = 75 GPD
(metric) = 5 x 57 = 285 LPD

1607.0 Required Area of Subsurface Irrigation/ Disposal Fields (See Figure 16-5.)

Each valved zone shall have a minimum effective irrigation area in square feet as determined by Table 16-2 for the type of soil found in the excavation, based upon a calculation of estimated gray water discharge pursuant to Section 1606.0 of this chapter, or the size of the holding tank, whichever is larger. The area of the irrigation/disposal field shall be equal to the aggregate length of the perforated pipe sections within the valved zone multiplied the width of the proposed irrigation/disposal field. Each proposed gray water system shall include at least three (3) valved zones, and each zone shall be in compliance with the provisions of the section. No excavation for an irrigation/disposal field shall extend within five (5) vertical feet of the highest known seasonal groundwater, nor to a depth where gray water may contaminate the groundwater or ocean water. The applicant shall supply evidence of groundwater depth to the satisfaction of the Authority Having Jurisdiction.

1608.0 Determination of Maximum Absorption Capacity.

(A) Wherever practicable, irrigation/disposal field size shall be computed from Table 16-2.

(B) In order to determine the absorption quantities of questionable soils other than those listed in Table 16-2, the proposed site may be subjected to percolation tests acceptable to the Authority Having Jurisdiction.

(C) When a percolation test is required, no gray water system shall be permitted if the test shows the absorption capacity of the soil is less than eighty-three hundredths (0.83) gallons per square foot (33.8 L/m²) or more than five and twelve hundredths (5.12) gallons per square foot (208.5 L/m²) of leaching area per twenty-four (24) hours.

1609.0 Holding Tank Construction. (See Figures 16-1, 16-2, 16-3 and 16-4.)

- (A) Plans for all holding tanks shall be submitted to the Authority Having Jurisdiction for approval. Such plans shall show all dimensions, structural calculations, bracings, and such other pertinent data as may be required. A minimum capacity of fifty (50) gallons (189 L) is required.
- (B) Holding tanks shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight.
- (C) Each holding tank shall be vented as required by Chapter 9 of this code and shall have a locking, gasketed access opening or approved equivalent to allow for inspection and cleaning.
- (D) Each holding tank shall have its rated capacity permanently marked on the unit. In addition, a sign stating GRAY WATER IRRIGATION SYSTEM, DANGER — UNSAFE WATER shall be permanently marked on the holding tank.
- (E) Each holding tank installed aboveground shall have an emergency drain separate from that connecting the tank with the irrigation/disposal fields and an overflow drain. The emergency and overflow drains shall have permanent connections to the building drain or building sewer, upstream of septic tanks, if any. The overflow drain shall not be equipped with a shutoff valve.
- (F) The overflow and emergency drainpipes shall not be less in size than the inlet pipe. The vent size shall be determined based on the total gray water fixture units as outlined in Table 7-5 of this code. Unions or equally effective fittings shall be provided for all piping connected to the holding tank.
- (G) Each holding tank shall be structurally designed to withstand all anticipated earth or other loads. All holding tank covers shall be capable of supporting an earth load of not less than three hundred (300) pounds per square foot (1464.6 kg/m²) when the tank is designed for underground installation.
- (H) If a holding tank is installed underground, the system must be designed so that the tank overflow will gravity drain to the existing sewer line or septic tank. The tank shall be protected against sewer line backflow by a backwater valve.
- (I) **Materials.**
 - (1) Holding tanks shall be steel, protected from corrosion, both externally and internally by an approved coating or other acceptable means; shall meet nationally recognized standards for the intended use; and shall be approved by the Authority Having Jurisdiction.

- (2) Holding tanks constructed of alternate material may be approved by the Authority Having Jurisdiction, provided they comply with approved applicable standards.

1610.0 Valves and Piping. (See Figures 16-1, 16-2, 16-3, and 16-4.)

Gray water piping discharging into the holding tank or having a direct connection to the sanitary drain or sewer piping shall be downstream of an approved waterseal-type trap(s). If no such trap(s) exists, an approved vented running trap shall be installed upstream of the connection to protect the building from any possible waste or sewer gases. All gray water piping shall be marked or have a continuous tape marked with the words DANGER — UNSAFE WATER. All valves, including the three-way valve, shall be readily accessible and approved by the Authority Having Jurisdiction. A backwater valve installed pursuant to this code shall be provided on all holding tank drain connections to the sanitary drain or sewer piping.

1611.0 Irrigation/Disposal Field Construction. (See Figure 16-5.)

- (A) Perforated sections shall be a minimum three (3) inch (80 mm) diameter and shall be constructed of perforated high-density polyethylene pipe, perforated ABS pipe, perforated PVC pipe, or other approved materials, provided that sufficient openings are available for distribution of the gray water into the trench area. Material, construction, and perforation of the pipe shall be in compliance with the appropriate absorption fields drainage piping standards and shall be approved by the Authority Having Jurisdiction.
- (B) Filter material, clean stone, gravel, slag, or similar filter material acceptable to the Authority Having Jurisdiction, varying in size from three-quarter (3/4) inch (20 mm) to two and one-half (2-1/2) inch (65 mm) shall be placed in the trench to the depth and grade required by this section. The perforated section shall be laid on the filter material in an approved manner. The perforated section shall then be covered with filter material to the minimum depth required by this section. The filter material shall then be covered with untreated building paper, straw, or similar porous material to prevent closure of voids with earth backfill. No earth backfill shall be placed over the filter material cover until after inspection and acceptance.
- (C) Irrigation/disposal fields shall be constructed as follows:
(See chart on following page)

(D) When necessary on sloping ground to prevent excessive line slopes, irrigation/disposal lines shall be stepped. The lines between each horizontal leaching section shall be made with approved watertight joints and installed on natural or unfilled ground.

1612.0 Special Provisions

(A) Other collection and distribution systems may be approved by the local Authority Having Jurisdiction, as allowed by Section 301.0 of this code.

(B) Nothing contained in this chapter shall be construed to prevent the Authority Having Jurisdiction from requiring compliance with higher requirements than those contained herein, where such higher requirements are essential to maintain a safe and sanitary condition.

	Minimum	Maximum
Number of drain lines per valved zone	1	—
Length of each perforated line	—	100 ft. (30,840 mm)
Bottom width of trench	12 in. (305 mm)	18 in. (457 mm)
Spacing of lines, center to center	4 ft. (1219 mm)	—
Depth of earth cover of lines	10 in. (254 mm)	—
Depth of filter material cover of lines	2 in. (51 mm)	—
Depth of filter material beneath lines	3 in. (76 mm)	—
Grade of perforated lines	level 3 in. / 100 ft.	2 mm/m

**TABLE 16-1
Location of Gray Water System**

Minimum Horizontal Distance in Clear Required From:	Holding Tank		Irrigation/ Disposal Field	
	Feet	(mm)	Feet	(mm)
Building structures ¹	5 ²	(1,524 mm)	2 ³	(610 mm)
Property line adjoining private property	5	(1,524 mm)	5	(1,524 mm)
Water supply wells ⁴	50	(15,240 mm)	100	(30,480 mm)
Streams and lakes ⁴	50	(15,240 mm)	50 ⁵	(15,240 mm)
Sewage pits or cesspools	5	(1,524 mm)	5	(1,524 mm)
Disposal field and 100% expansion area	5	(1,524 mm)	4 ⁶	(1,219 mm)
Septic tank	0	(0)	5	(1,524 mm)
On-site domestic water service line	5	(1,524 mm)	5	(1,524 mm)
Pressurized public water main	10	(3,048 mm)	10 ⁷	(3,048 mm)

Note: When irrigation/disposal fields are installed in sloping ground, the minimum horizontal distance between any part of the distribution system and the ground surface shall be fifteen (15) feet (4,572 mm).

- ¹ Including porches and steps, whether covered or uncovered, breezeways, roofed porte cocheres, roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.
- ² The distance may be reduced to zero feet for aboveground tanks when first approved by the Authority Having Jurisdiction.
- ³ Assumes a 45-degree (0.79 rad) angle from foundation.
- ⁴ Where special hazards are involved, the distance required shall be increased as may be directed by the Authority Having Jurisdiction.
- ⁵ These minimum clear horizontal distances shall also apply between the irrigation/disposal field and the ocean mean higher hightide line.
- ⁶ Plus two (2) feet (610 mm) for each additional foot of depth in excess of one (1) foot (305 mm) below the bottom of the drain line.
- ⁷ For parallel construction/for crossings, approval by the Authority Having Jurisdiction shall be required.

**TABLE 16-2
Design Criteria of Six Typical Soils**

Type of Soil	Minimum square feet of irrigation/leaching area per 100 gallons of estimated gray water discharge per day	Maximum absorption capacity in gallons per square foot of irrigation/leaching area for a 24-hour period
Coarse sand or gravel	20	5.0
Fine sand	25	4.0
Sandy loam	40	2.5
Sandy clay	60	1.7
Clay with considerable sand or gravel	90	1.1
Clay with small amounts of sand or gravel	120	0.8

**TABLE 16-2
(Metric) Design Criteria of Six Typical Soils**

Type of Soil	Minimum square meters of irrigation/leaching area per liter of estimated gray water discharge per day	Maximum absorption capacity in liters per square meter of irrigation/leaching area for a 24-hour period
Coarse sand or gravel	0.005	203.7
Fine sand	0.006	162.9
Sandy loam	0.010	101.8
Sandy clay	0.015	69.2
Clay with considerable sand or gravel	0.022	44.8
Clay with small amounts of sand or gravel	0.030	32.6

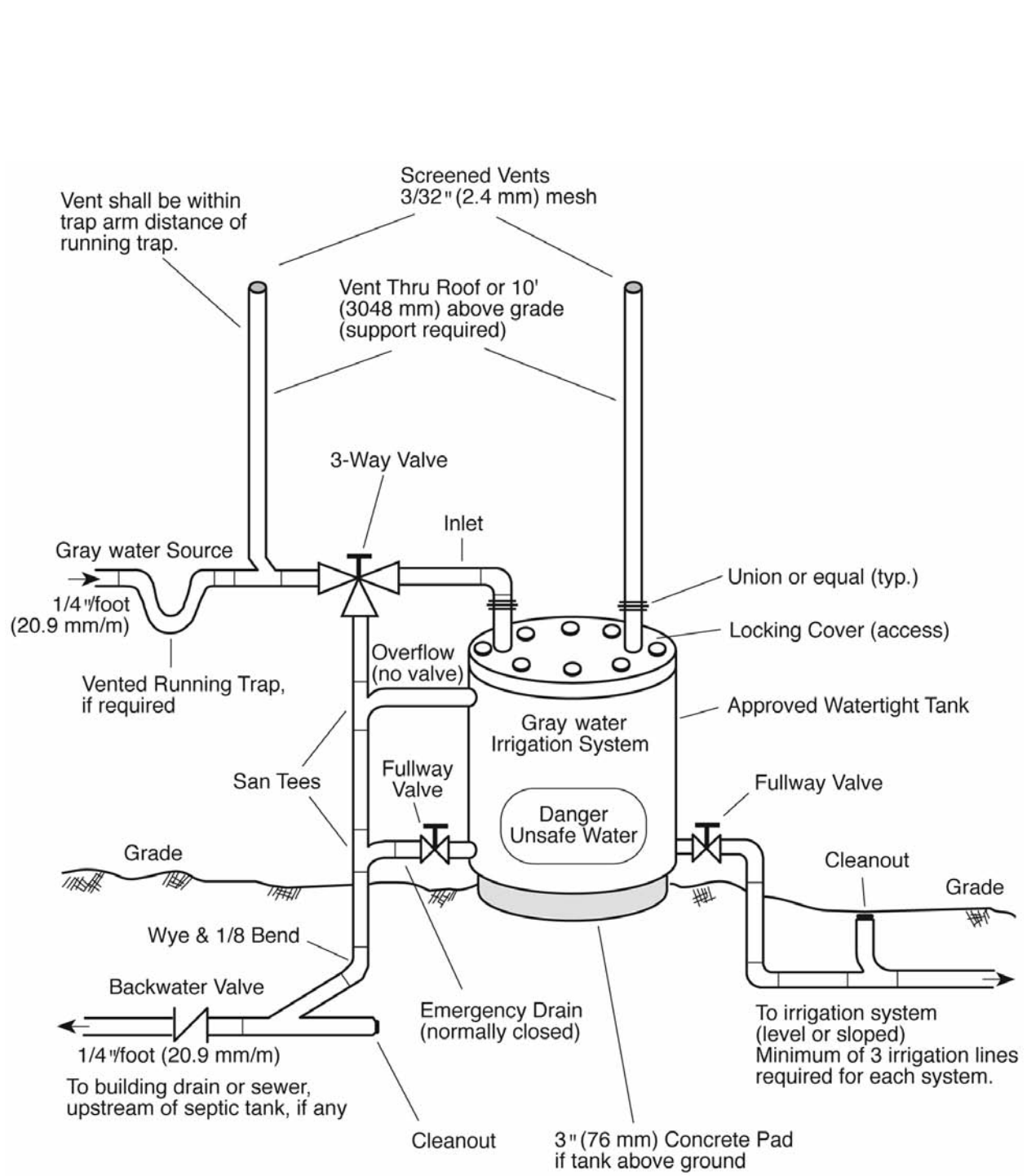


FIGURE 16-1 Gray Water System Tank – Gravity.

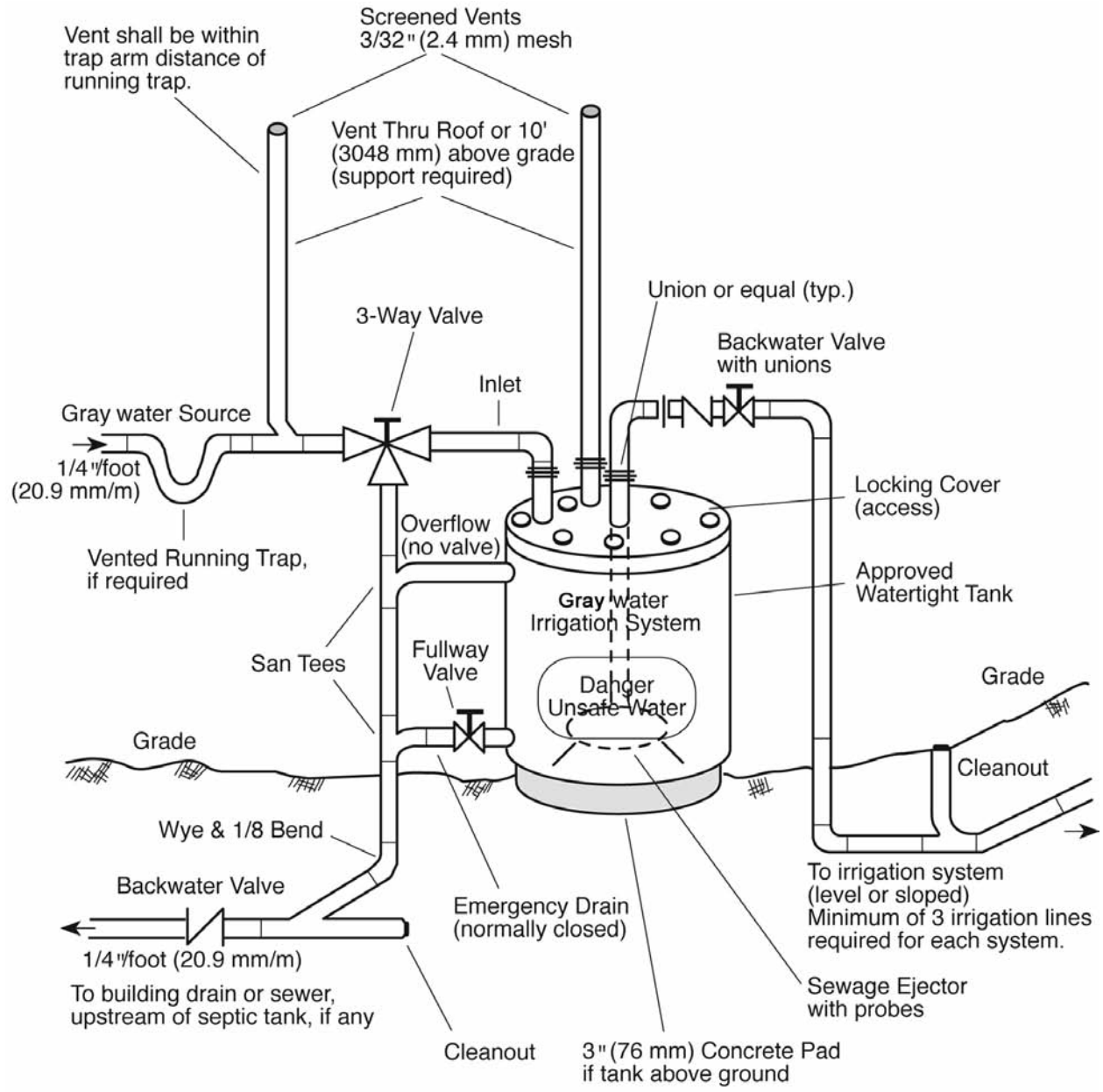


FIGURE 16-2 Gray Water System Tank – Pumped.

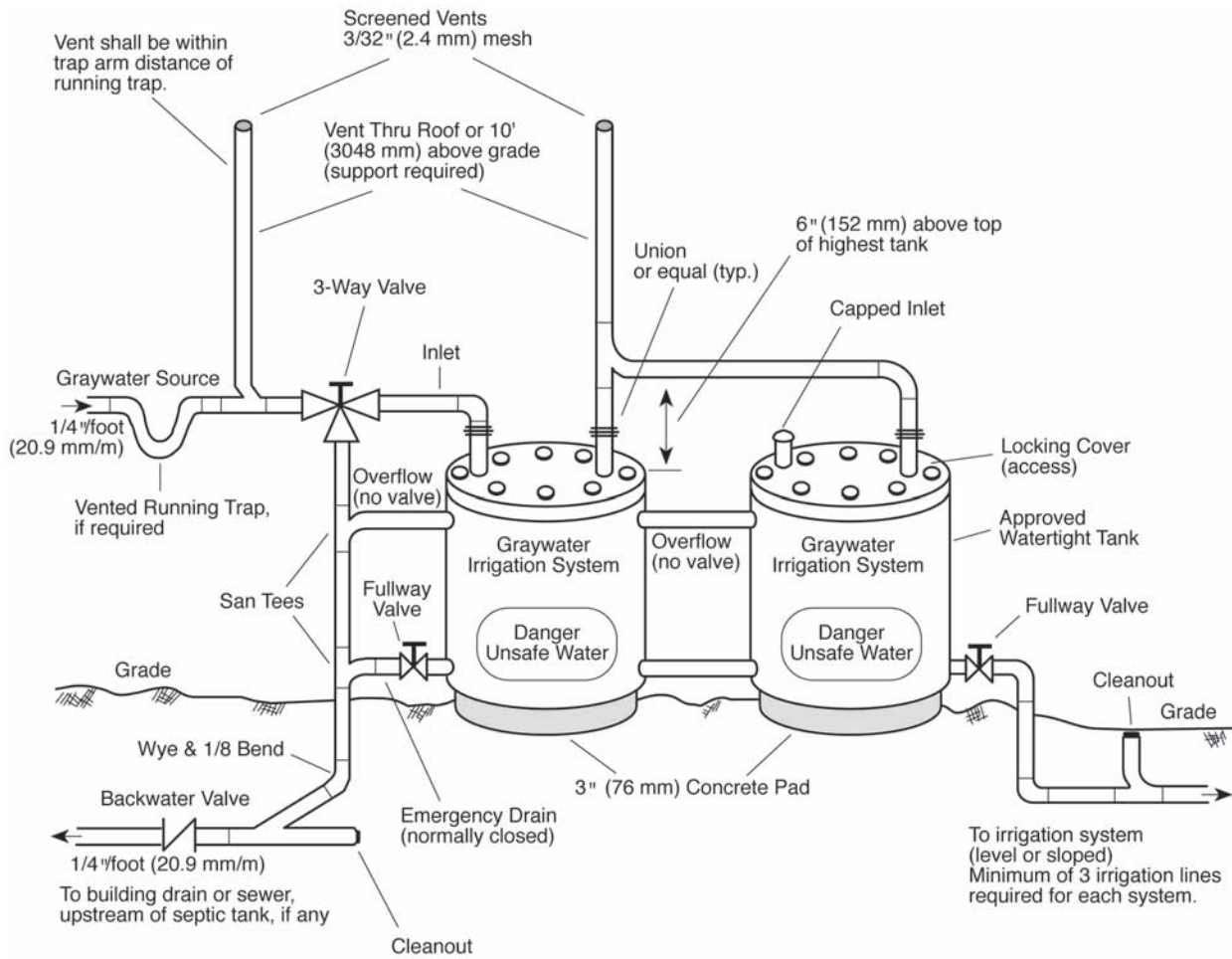


FIGURE 16-3 Gray Water System Multiple-Tank Installation.

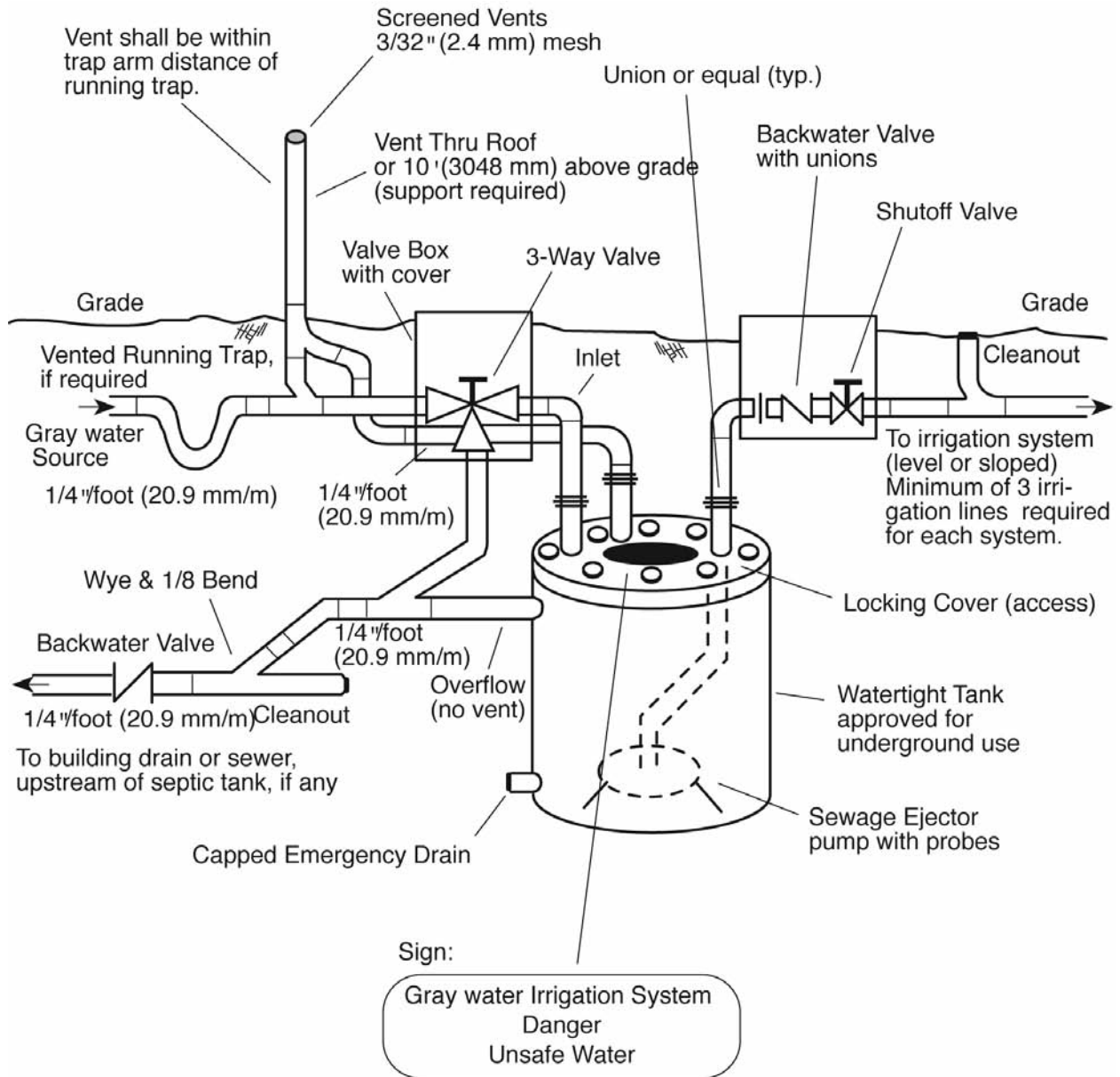
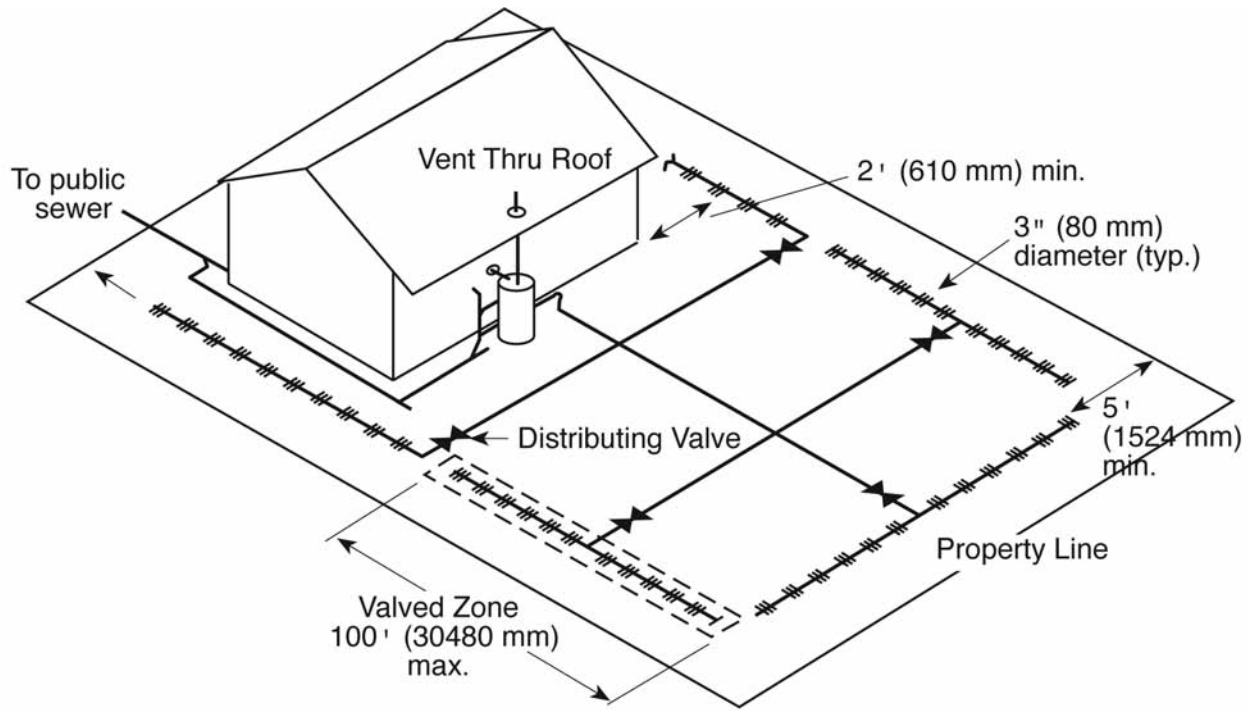


FIGURE 16-4 Gray Water System Underground Tank – Pumped.



Note: Each valved zone shall have a minimum effective absorption/irrigation area in square feet predicated on the estimated graywater discharge in gallons per day and on the type of soil found in the area. The area of the field shall be equal to the aggregate length of perforated pipe sections within the valved zone times the width of the proposed field.

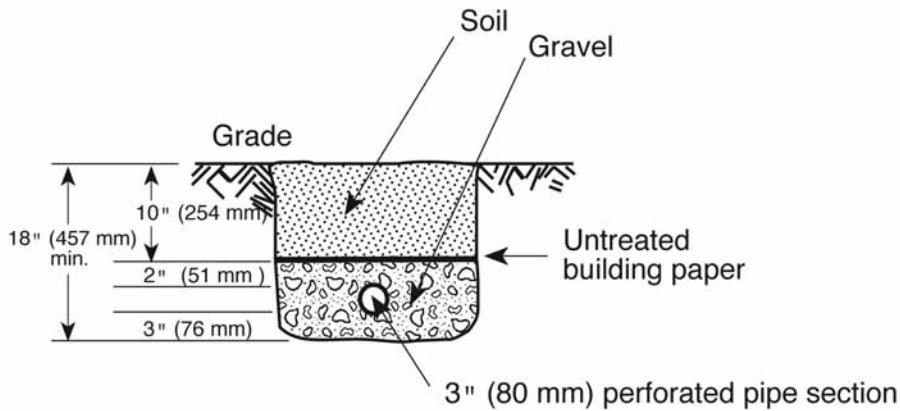


FIGURE 16-5 Gray Water System Typical Irrigation Layout.